SIP RACT Analysis for Kennecott Refinery, Smelter and Molybdenum Autoclave Process

The Kennecott Utah Copper (KUC) Refinery, Smelter and the Molybdenum Autoclave Process (MAP) are located in the northwest corner of Salt Lake County, Utah. The Smelter processes copper concentrates by means of flash smelting and flash converting furnaces. Molten copper at approximately 99.5 percent purity is cast into plate anodes to be sent to the refinery for further purification. At the refinery, anodes are lowered into an electrolyte solution where for 10 days, an electric current is sent between the anode and the cathode, causing the copper ions to migrate to the steel sheet forming a plate of 99.99 percent pure copper.

The Smelter is currently operating under Approval Order (AO) DAQE AN103460049-11, issued on May 3, 2011. This AO allowed the addition of a 998 horsepower diesel-fired emergency generator to provide a backup energy source for the waste heat boiler emergency circulation pumps. The refinery is operating under the AO DAQE-AN0103460045-10, issued on April 6, 2010. This AO allowed KUC to construct a new Combined Heat and Power (CHP) Unit at their Refinery. The CHP Unit is natural gas fired and has been designed to provide electricity and to replace the steam that was provided by the north and south boilers. The MAP is operating under the AO DAQE-0103460046-10 that was issued on August 10, 2012. This AO was a modification to the original AO issued in 2008. The 2008 AO allowed two natural gas-fired boilers which were replaced with a CHP unit under authority of the 2010 AO.

Starting in June 2010 DAQ held several meetings with KUC to discuss the $PM_{2.5}$ SIP and the required RACT analysis. KUC submitted a RACT analysis on December 12, 2011. This RACT analysis was reviewed and DAQ and submitted comments to KUC. KUC submitted a revised analysis on March 6, 2012. DAQ reviewed this RACT analysis. KUC submitted a final RACT analysis on August 9, 2012. DAQ agrees with the final RACT analysis submitted by KUC.

The potential to emit at the Smelter, Refinery and MAP are as follows:

	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Smelter	503	503	185	1,085	13.5	85.81
Refinery	25.6	25.64	38.6	4.4	8.42	37.4
MAP	14.3	14.4	27.99	1.23	5.82	29.25

The sources reviewed for RACT at the Refinery are outlined below:

Boilers: These natural gas fired boilers are rated at 82 MMBtu/hr each and are operated to meet the steam demand at the Refinery.
DAQ accepts the use of Flue Gas Recirculation and Low NO_x burners with good combustion practices as meeting RACT.

CHP: The CHP unit will generate power and steam to support Refinery operations. The CHP unit uses a low NO_x duct burner and the turbine has SoLoNOx burners.
DAQ accepts the use of a low NO_x duct burner and the SoLoNO_x burners for the turbine as RACT.

Emergency Backup Generator: Diesel-fired emergency generator equipped with turbo chargers and after coolers.
DAQ accepts RACT for the diesel fired generator as a turbo charger with after cooler and limiting the fuel to be low sulfur fuel.

Small Space Heaters: Natural gas-fired space heaters are used for comfort heating and cooling, and water heating throughout the power plant complex. The space heaters use low NO_x burners and regular inspections are done to the units to ensure optimum combustion performance. All space heaters are rated at less than 5 MMBTU/hr.
DAQ accepts the space heaters with proper maintenance as meeting RACT.

Cooling towers: Noncontact water cooling towers used to control waste heat from the boilers. All towers are equipped with drift eliminators with drift loss rated at 0.002 percent.
DAQ accepts the current cooling towers with drift eliminators as RACT.

Precious Metals Recovery Scrubber: Gold, silver, selenium, copper telluride, and lead salts are recovered in a series of hydrometallurgical processes. Acidic gases from the processes are collected, scrubbed with a soda ash solution, and exhausted through the sodium based scrubber.
DAQ accepts the use of a scrubber to control the SO_2 emissions from the Precious metals plant as RACT.

<u>The sources reviewed for RACT at the Smelter are outlined below:</u>

Powerhouse Holman Boiler: The boiler is used to provide process steam at the Smelter.
DAQ accepts the use of Low NO_x burners as RACT.

Main Stack: Multiple process equipment and their emissions are routed through the main stack. Such equipment includes the matte granulator, slag granulator, acid plant, power house, furnaces, dryers and grinding circuits. Each of these sources of emissions have their primary control devices (baghouse, scrubbers, etc.). Some are then routed to the secondary gas system and than through the main stack.
DAQ accepts the current practice of using scrubbers and baghouses for the individual emission sources as meeting RACT.

Emergency Backup Generator: Diesel-fired emergency generator equipped with turbo chargers and after coolers.
DAQ accepts RACT for the diesel fired generator as a turbo charger with after cooler and limiting the fuel to be low sulfur fuel.

Wet Feed Baghouse: Silica flux, concentrate, and converter slag are transferred directly to feed bins then conveyed to the dryer. Particulate emissions from the loading of wet flux and concentrate and from transfer points of the conveyor are vented to a baghouse.
DAQ accepts the use of a baghouse to control $PM_{2.5}$ emissions as RACT.

Granulators: Slag and Matte granulators vented through a stack with a wet scrubber.
DAQ accepts the use of a wet scrubber as RACT for controlling the $PM_{2.5}$ emissions from the granulators.

Feed Storage Building: Wet copper concentrate feed is stored in the enclosed wet feed storage building. Particulate emissions from loading materials into the feed storage building, from reclaiming materials, and from conveyor/transfer point are vented to a baghouse.
DAQ accepts the use of a baghouse to control $PM_{2.5}$ emissions as RACT.

Cooling towers: Three noncontact water cooling towers used to control processes at the smelter. All towers are equipped with drift eliminators with drift loss rated at 0.002 percent.
DAQ accepts the current cooling towers with drift eliminators as RACT for $PM_{2.5}$ emissions.

Anode Area Fugitives: Emissions from the anode building process are controlled with a baghouse, quench tower and scrubber. However, some emissions escape as fugitives.
DAQ accepts the use of collection hoods on anode building processes to reduce fugitives as RACT.

Smelter Fugitives: Emissions from smelter processes are controlled with appropriate control technologies. However, some emissions escape as fugitives.
DAQ accepts the use of collection hoods and minimizing fugitives as RACT.

The sources reviewed for RACT at the MAP are outlined below:

CHP: The CHP unit will generate power and steam to support Refinery operations. The CHP unit uses a low NO_x duct burner and the turbine has $SoLoNO_x$ burners.
DAQ accepts the CHP equipped with low NO_x duct burner and the turbine using $SoLoNO_x$ burners as meeting RACT.

Product Drying, Storage, Packing, and Reagent Storage: The group of sources includes the Briquette Dryer, ADM dryer, Packaging Area, and reagent silos. They are vented through a baghouse.
DAQ accepts a baghouse as RACT for controlling the $PM_{2.5}$ emissions from these sources.